Assignment 1

Textbook assignment: Chapter 1, "Logarithms," pages 1-1 through 1-27 and Chapter 2, "Computations with Logarithms," pages 2-1 through 2-17.

Learning Objective:

Apply the Laws for Logarithms and interpret logarithm tables.

1-1. A logarithm is an exponent.

1. True
2. False

In items 1-2 through 1-5, consider the expression $\log_u T = v$ and select from column B the letter that matches the description listed in column A.

	A. DESCRIPTIONS	B. LETTERS
1-2.	Base	1. T
1-3.	The value of u^v	2. u
1-4.	Exponent	3. v
1-5.	Logarithm	

1-6. Which of the following equations is the correct logarithmic form of $3^2 = 9$?

1. $\log_2 3 = 9$
2. $\log_2 9 = 3$
3. $\log_3 9 = 2$
4. $\log_9 3 = 2$

1-7. Which of the following equations is the correct exponential form of $\log_a b = c$?

1. $a^c = b$
2. $a^b = c$
3. $b^a = c$
4. $c^a = b$

1-8. Which of the following equations is equal to $\log_b a$ if $b^x = a$?

1. $\log_x b$
2. a
3. b
4. x

1-9. If $R = 10^s$ and $T = 10^u$, the value of RT is

1. $(R + T)^{10}$
2. $(s + u)^{10}$
3. $10^{(s + u)}$
4. $10^{(R + T)}$

1-10. The logarithm of a product is equal to the

1. product of the factors
2. sum of the logarithms of the factors
3. product of the logarithms of the factors
4. difference of the logarithms of the factors

1-11. From the logarithmic equations below, select the one that is correct for finding the product of S and T.

1. $ST = \log_{10} S + \log_{10} T$
2. $\log_{10} ST = \log_{10} S - \log_{10} T$
3. $\log_{10} ST = \log_{10} S + \log_{10} T$
4. $\log_{10}(S + T) = \log_{10} S \log_{10} T$

1-12. The logarithmic equation for finding the quotient of u/v is

1. $\frac{u}{v} = \log_{10}u - \log_{10}v$
2. $\log_{10}\frac{u}{v} = \log_{10}v \log_{10}u$
3. $\log_{10}\frac{u}{v} = \log_{10}v - \log_{10}u$
4. $\log_{10}\frac{u}{v} = \log_{10}u - \log_{10}v$

1-13. The logarithmic equation for finding Q^r is

1. $\log_{10}Q^r = r \log_{10}Q$
2. $\log_{10}Q^r = \log_{10}Q \log_{10}r$
3. $\log_{10}Q^r = \log_{10}Q + \log_{10}r$
4. $Q^r = r \log_{10}Q$

1-14. From the logarithmic equations below, select the one that is correct for finding $\sqrt[c]{D}$.

1. $\sqrt[c]{D} = \frac{1}{c} \log_{10}D$
2. $\log_{10}\sqrt[c]{D} = \frac{1}{c} \log_{10}D$
3. $\log_{10}\sqrt[c]{D} = c \log_{10}D$
4. $\log_{10}\sqrt[c]{D} = \log_{10}c \log_{10}D$

1-15. Find $\sqrt{10,000}$ using logarithms.

1. 10
2. 2
3. 100,000,000
4. 100

1-16. Which of the following equations is the exponential form of log P = N?

1. $10^N = P$
2. $10^P = N$
3. $N^P = 10$
4. $P^N = 10$

1-17. Common logarithms have what number for their base?

1. 2.4997
2. 2
3. 10
4. 100

1-18. The fractional part of a logarithm is the characteristic.

1. True
2. False

1-19. The logarithm of a number greater than 10 and less than 100 has a characteristic of

1. 1
2. 2
3. 3
4. 0

1-20. The characteristic of the logarithm of an integer is the same as the power of 10 when the integer is written in scientific notation.

1. True
2. False

1-21. What is the characteristic of a number greater than one-tenth but less than one?

1. 1
2. 0
3. -1
4. -2

1-22. What is the characteristic of the logarithm of 0.000056?

1. 0
2. 5
3. -3
4. -5

1-23. A logarithm with a characteristic of negative 3 and a mantissa of 0.2095 may be correctly written in which of the following ways?

1. -7.2095
2. -3.2095
3. 0.2095 - 7
4. 7.2095 - 10

● In answering items 1-24 through 1-26, refer to appendix I in the text.

1-24. The mantissa for the logarithm of 136 is

1. 0.1139
2. 0.1335
3. 0.4857
4. 0.5563

1-25. The common logarithm of 436 is

1. 0.6395
2. 0.6335
3. 2.6395
4. 2.6335

1-26. The common logarithm of 1.47 is

1. 1,673
2. 1.1673
3. 0.1461
4. 0.1673

1-27. What fractional part of the way between the mantissa of 2,350 and 2,360 is the mantissa of the logarithm of 2,357 located?

1. 2/10
2. 3/10
3. 5/10
4. 7/10

● In answering items 1-28 and 1-30, use appendix I and interpolation.

1-28. The common logarithm of 0.3075 is

1. 2.03
2. 0.4879
3. 9.4879 - 10
4. -1.5121

1-29. The common logarithm of 3,246 is

1. 3.5113
2. 3.5105
3. 0.5113
4. 7.5113 - 10

1-30. The common logarithm of 0.02367 is

1. 8.6258 - 10
2. 8.3742 - 10
3. 0.3742
4. -2.3742

1-31. An antilogarithm is a number that corresponds to a given

1. interpolation
2. mantissa only
3. characteristic only
4. logarithm

1-32. The antilogarithm of 2.1461 is between which of the following numbers?

1. 10 and 100
2. 100 and 1,000
3. 1,000 and 10,000
4. 10,000 and 100,000

● In answering items 1-33 through 1-35, refer to appendix I.

1-33. The antilogarithm of 2.1461 is

1. 0.3316
2. 1.40
3. 140
4. 0.0140

1-34. Interpolate to find antilog 7.3842 - 10.

1. 2,422
2. 2.422
3. 0.04129
4. 0.002422

1-35. Interpolate to find the antilogarithm of 1.6528.

1. 44.96
2. 45.5
3. 0.1283
4. 4.496

1-36. Given $e^x = N$, where N is any number, how does one arrive at the equation $x \ln e = \ln N$?

1. By taking the common logarithm of both the right and left members of $e^x = N$
2. By taking the natural logarithm of both the right and left members of $e^x = N$
3. By squaring both the right and and left members of $e^x = N$
4. By multiplying both the right and left members of $e^x = N$ by ln x

1-37. The value of $\log_e e$ is

1. 1
2. N
3. e
4. x

1-38. The equation x = ln N is equivalent to the equation

1. ln e = ln N
2. log x = ln N
3. x ln e = ln N
4. x log e = N

1-39. Considering the equation ln N = 2.3026 log N, the natural logarithm of 27 is

1. 0.9933
2. 3.2959
3. 3.7340
4. 62.1702

Learning Objective:

Perform computations with logarithms.

In items 1-40 through 1-43, select from column B the operation that is indicated by the illustrations of the Laws for Powers and Roots in column A.

A. ILLUSTRATIONS	B. OPERATIONS
1-40. $(xy)^s = x^s y^s$	1. nth root of a power
1-41. $r^{-b} = \frac{1}{r^b}$	2. Product raised to a power
1-42. $x^v x^w = x^{v+w}$	3. Negative power
1-43. $\sqrt[L]{d^K} = d^{K/L}$	4. Multiplication

1-44. All the digits of an approximate number are always significant digits.

1. True
2. False

● In items 1-45 through 1-47, use logarithms to find the products to four significant digits.

1-45. The product of 3,460 and 576 is

1. 4,036
2. 6,299,500
3. 1,993,000
4. 3,606,000

1-46. The product of (-387)(225)(67) is

1. -5,834,000
2. 5,834,000
3. -6,766,000
4. 6,766,000

1-47. The product of 1.56 x 0.087 x 0.02 is

1. 0.02714
2. 1.667
3. 2.566
4. 0.002714

1-48. In solving the division problem 18/2.38 by means of logarithms you would use the antilogarithm of which of the following numbers to determine the quotient?

1. -0.1213
2. 0.8787
3. 7.563
4. 1.6319

● In items 1-49 and 1-50, use logarithms to find the quotients to four significant digits.

1-49. The quotient of 36.8/2.7 is

1. 1.1344
2. 1.363
3. 13.63
4. 99.36

1-50. The quotient of 1.87/0.004 is

1. 0.007428
2. 1.866
3. 2.6697
4. 467.4

● In items 1-51 and 1-52, use logarithms to find a number raised to a power to four significant digits.

1-51. The value of $(28.6)^4$ is

1. 5.8256
2. 114.4
3. 172.2
4. 669,300

1-52. The number 2.045 raised to the sixth power is

1. 73.15
2. 39.03
3. 12.27
4. 1.8642

● In items 1-53 through 1-55, use logarithms to find the nth root of a number to four significant digits.

1-53. The fifth root of 243 is

1. 1.194
2. 2.3856
3. 3.000
4. 3.118

1-54. The square root of 756 is

1. 2.750
2. 27.50
3. 378.0
4. 571,500

1-55. The value of $\sqrt{0.000441}$ is

1. 0.00021
2. 0.02100
3. 2.100
4. 210.0

1-56. Using the Laws for Algebra and the Laws for Logarithms, choose the simplified form of $\log \frac{x^2 + 3x + 2}{3x + 6}$ from the following expressions.

1. $\log 3 - \log (x + 1)$
2. $\log (x + 1) + \log 3$
3. $\log (x + 1) - \log 3$
4. $\log (x^2 + 3x + 2) - 3 \log (x + 2)$

● In items 1-57 through 1-59, use logarithms to find the value of x to four significant digits.

1-57. The value of x in $3^x = 729$ is

1. 2.386
2. 6.000
3. 1.366
4. 3.340

1-58. The value of x in $18^x = 240$ is

1. 1.896
2. 2.988
3. 3.636
4. 13.33

1-59. Find the value of x in the equation $x^{3/4} = 3$.

1. 0.0001514
2. 0.6361
3. 2.279
4. 4.326

1-60. Of the equations below, which is a correct logarithmic form of $s = \frac{1}{2}gt^2$?

1. $\log s = \log g + 2 \log t - \log 2$
2. $\log s = \log g + 2 \log t + \log 2$
3. $\log s = \frac{1}{2}(\log g + 2 \log t)$
4. $s = \frac{1}{2} \log g + \log t^2$

1-61. Of the equations below, which is a correct logarithmic form of $r = \sqrt{\frac{v}{\pi h}}$?

1. $\log r = \log v - \log \pi - \log h - \log 2$
2. $\log r = \frac{1}{2}(\log v + \log \pi \log h)$
3. $\log r = \frac{1}{2}(\log v - \log \pi + \log h)$
4. $\log r = \frac{1}{2}(\log v - \log \pi - \log h)$

● In items 1-62 and 1-63, use logarithms to solve for the numerical value of the unknown to four significant digits.

1-62. The formula $r = \sqrt{\frac{v}{\pi h}}$ is use to find the radius, r, of a cylinder when the volume, v, and height, h, are known. Based on this formula, what is the radius of a cylinder that has a volume of 478 cubic inches and a height of 14.5 inches? (Let $\pi = 3.142$.)

1. 0.5104 inches
2. 3.239 inches
3. 5.246 inches
4. 46.97 inches

1-63. The formula for the surface area of a sphere is $A = 4\pi r^2$, where A is the surface area and r is the radius of the sphere. Based on this formula, what is the surface area of a sphere that has a radius of 1.16 inches? (Let $\pi = 3.142$.)

1. 1.2283 square inches
2. 29.16 square inches
3. 16.92 square inches
4. 212.6 square inches